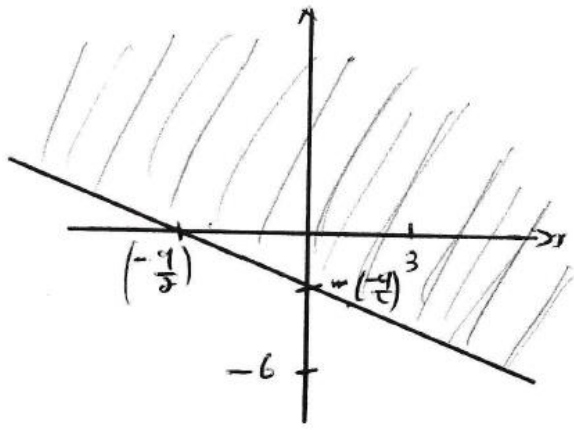
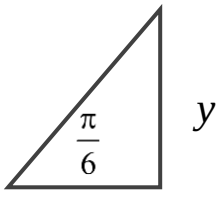
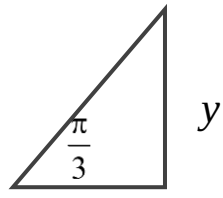
Question	Scheme	Marks	AOs
7(i)		M1	3.1a
		A1	1.1b
		B1	1.1b
		(3)	
(ii)	$m=\tan\left(\frac{\pi}{3}\right)\left\{=\sqrt{3}\right\}$ and $y-0=m\left(x-2\right)$ leads to $y-0=\sqrt{3}\left(x-2\right)$ or $y=\sqrt{3}x-2\sqrt{3}$ $m=\tan\left(\frac{\pi}{6}\right)\left\{=\frac{\sqrt{3}}{3}\right\}$ and $y-0=m\left(x-\left(-1\right)\right)$ leads to $y-0=\frac{\sqrt{3}}{3}\left(x-\left(-1\right)\right)$ or $y=\frac{\sqrt{3}}{3}x+\frac{\sqrt{3}}{3}$	M1 A1 A1	3.1a 1.1b 1.1b
	$\sqrt{3}x-2\sqrt{3}=\frac{\sqrt{3}}{3}x+\frac{\sqrt{3}}{3}\Rightarrow x=...$	M1	1.1b
	$y=\sqrt{3}\left(\frac{7}{2}\right)-2\sqrt{3}=...$	M1	1.1b
	$\left\{w=\right\}\frac{7}{2}+\frac{3\sqrt{3}}{2}\mathrm{i}$	A1	2.1
		(6)	
	Alternative $\tan\left(\frac{\pi}{6}\right)=\frac{\sqrt{3}}{3}=\frac{y}{x_{-1}}$ and $\tan\left(\frac{\pi}{3}\right)=\sqrt{3}=\frac{y}{x_2}$	M1	1.1b
	 $x_{-1}=\sqrt{3}y$  $x_2=\frac{\sqrt{3}}{3}y$	A1 A1	1.1b 1.1b

	$y\sqrt{3} = y\frac{\sqrt{3}}{3} + 3 \Rightarrow y = ...$	M1	3.1a
	Uses $x = y\sqrt{3} - 1$ or $x = \frac{\sqrt{3}}{3}y + 2$ with their value of y leading to a value for x	M1	1.1b
	$\left(w =\right)\frac{7}{2} + \frac{3\sqrt{3}}{2}\text{i}$	A1	2.1
		(6)	

(9 marks)

Notes:

(i)

M1: Draws a **single** straight line through **both axes** with a negative gradient. Ignore any line joining (3, 0) and (0, -6)

A1: Draws a **single** straight line through **both axes** with a negative gradient which has a negative y intercept**.** Ignore any intercept marked on the axes. Ignore any line joining (3, 0) and (0, -6)

B1: Shades the area above their straight line (not a bounded region such as a triangle bounded by the axes and the line)

(ii)

M1: Finds the Cartesian equations for both loci by using the gradient as tan(argument) and correct coordinate. Must be an attempt at both equations but one correct equation scores this mark

A1: One equation correct, need not be simplified

A1: Both equations correct, need not be simplified

M1: Solve simultaneously to find either the real or imaginary component.

M1: Finds the other component to complete the process of finding w.

A1: Correct exact answer

Note: If leaves the answer as a coordinate this is A0. If defines $w = a + b\text{i}$ and then states $a = \frac{7}{2}$ and $b = \frac{3\sqrt{3}}{2}$ this is A1

Alternative

M1: Use both arguments to form equations involving x and y

A1: (One correct triangle) value for x in terms of y

A1: (Two correct triangles), values for x in terms of y

M1: Forms and solves an equation $y\sqrt{3} = y\frac{\sqrt{3}}{3} + 3 \Rightarrow y = ...$ must be come from $x_2 = x_{-1} + 3$

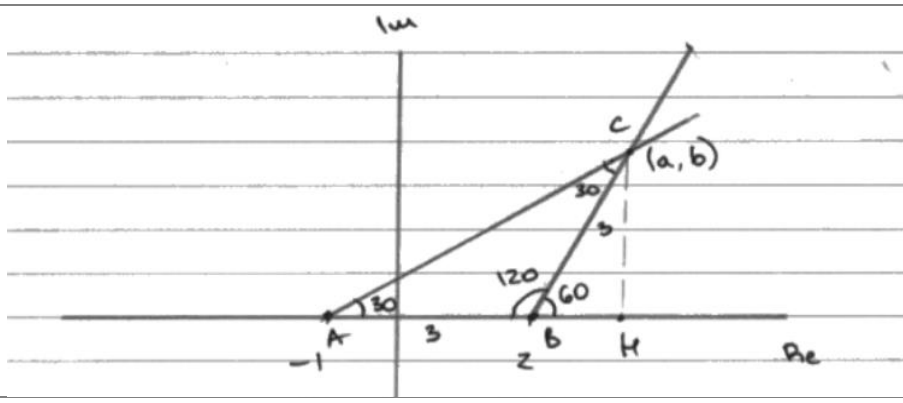
M1: Uses their y value and $x = y\sqrt{3} - 1$ or $x = \frac{\sqrt{3}}{3}y + 2$ to find a value for x

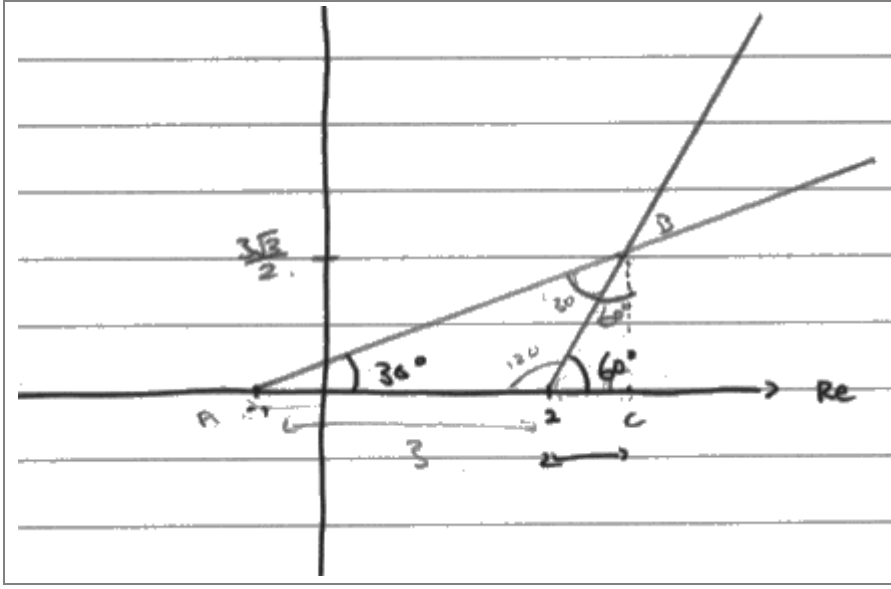
A1: Correct exact answer

Note: If candidates use decimal instead of exact values throughout allow the method marks

$y = 1.73x - 3.46$ and $y = 0.58x + 0.58$

Q7(ii) Two alternatives seen

		
Alternative 3 $b = 3\sin\left(\frac{\pi}{3}\right)$ and $c = 3\cos\left(\frac{\pi}{3}\right)$	M1 A1 A1	3.1a 1.1b 1.1b
$b = 3\sin\left(\frac{\pi}{3}\right) = ...$	M1	1.1b
$a = 2 + 3\cos\left(\frac{\pi}{3}\right) = ...$	M1	1.1b
$(w =)\frac{7}{2} + \frac{3\sqrt{3}}{2}\mathrm{i}$	A1	2.1
	(6)	
Alternative 3 **M1**: Uses correct geometry to form equations involving *a* and *c* **A1**: One correct equation **A1:** Two correct equations **M1:** Finds the imaginary component **M1:** Uses 2 + their *c* to find the real component **A1:** Correct exact answer		

Alternative 4 $\frac{3}{\sin 30} = \frac{AB}{\sin 120}$ $AB = 3\sqrt{3}$		M1 A1	3.1a 1.1b
$\sin 30 = \frac{BC}{3\sqrt{3}}$ $BC = \frac{3}{2}\sqrt{3}$	$\sin 60 = \frac{AC}{3\sqrt{3}}$ $AC = \frac{7}{2}$	M1 A1	1.1b 1.1b
Uses trigonometry to find the other component		M1	1.1b
$\left(w =\right)\frac{7}{2} + \frac{3\sqrt{3}}{2}\mathrm{i}$		A1	2.1
		(6)	
Alternative 4 **M1**: Uses the sine rule to find the length *AB* **A1**: Correct length *AB* **M1:** Uses trigonometry to find either the real or imaginary component A1: Correct real or imaginary component **M1:** Uses trigonometry to find the other component **A1:** Correct exact answer			